P–GJPO–128

Statement of Work for the Monticello Mill Tailings Site

Well Abandonment Plan

June 1991

Work performed under DOE Contract No. DE–AC07–86ID12584 for the **U.S. Department of Energy**
Grand Junction Projects Office

Geotech, Inc.

STATEMENT OF WORK

FOR THE

MONTICELLO MILL TAILINGS SITE WELL ABANDONMENT PLAN
MONTICELLO, UTAH

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FOR
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MONTICELLO, UTAH

1.0 LOCATION

This project entails the abandonment of three water production wells and four bedrock core holes at the Monticello Mill Site, Monticello, Utah. The 78 acre Monticello Mill Tailings Site is located along Montezuma Creek, on the south side of the City of Monticello, Utah in the north central portion of San Juan County. The project site lies directly east of U.S. Highway 191. The millsite property lies in Section 36, Township 33 South, Range 23 East, and in Section 31, Township 33 South, Range 24 East (Salt Lake Meridian).

2.0 SCOPE AND OBJECTIVE

This project is being conducted by Chem-Nuclear Geotech, (Geotech), a contractor to the United States Department of Energy (USDOE), under a Federal Facilities Agreement with the United States Environmental Protection Agency and the State of Utah. The purpose of the proposed action is to abandon three water production wells, designated Mill-1, Mill-2 and Mill-3, and four bedrock core holes, 34A, 36B, 59 and 63 which are located on and adjacent to the tailings piles (Figure 1). Abandonment procedures will be conducted in compliance with the State of Utah Division of Water Rights procedures for the abandonment of water wells, Administrative Rules for Water Well Drillers, R625-4, U.A.C.

It is estimated that the water production wells are approximately 200 to 250 feet deep, and the coreholes range in depth from 35 to 160 feet. The water production wells were constructed in the early 1950s, and partially cased with 6-inch diameter steel. The coreholes were constructed in the early 1980s, and are cased to competent bedrock.

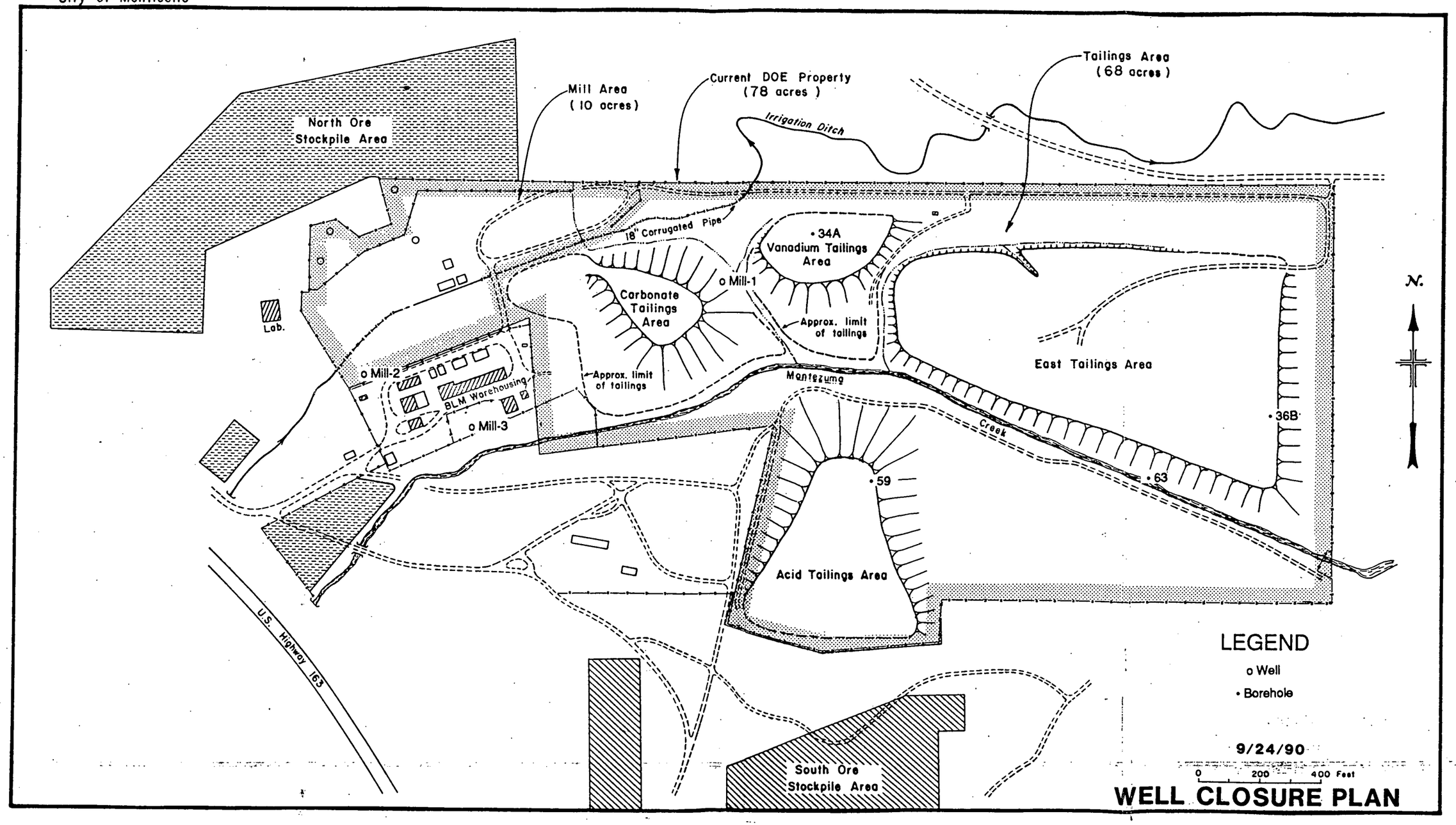
3.0 WELL ABANDONMENT TASKS

General Description

The abandonment tasks for the three wells and four coreholes will conform to the requirements outlined in the State of Utah well abandonment guidelines. The casing or borehole will be filled with a pre-approved, non-shrink, non-toxic grout or plugging material such as Volclay Grout or equivalent product to prevent vertical migration of water in the well or corehole. Vertical migration of water through the annular space surrounding the well casing will be controlled by cutting the casing at five foot intervals and pressure injecting the plugging material into the annular space, or by removing the casing and using a tremie pipe or equivalent to fill the hole. Twelve feet from the final ground surface elevation expected to be achieved during remediation, a 10-foot cement grout plug will be placed. For wells or coreholes where the expected surface elevation subsequent to remediation equals the existing surface elevation, the casing, if still in place, will be trimmed and capped 2-feet below ground surface, and the excavated hole backfilled with earth materials. A report describing the abandonment

FIGURE 1

SURPLUS FACILITIES MANAGEMENT PROGRAM
MONTICELLO DECONTAMINATION & DECOMMISSIONING
SITE PLAN



procedures will be prepared and signed by the drilling Subcontractor. Geotech will attach any additional information considered necessary and submit the report to the State of Utah, State Engineer.

During the abandonment operation, all fluids and sediments will be contained in ponds. The construction of these ponds is discussed in Section 6 of this Scope of Work. Cuttings, which may consist of tailings and native rock, will be removed to a designated location on the East Tailings Area (Figure 1).

Description of Wells and Boreholes

Well and corehole total depths and water levels have been measured and a caliper log of the wells (included in Appendix A) recently completed. This information is summarized in Table 1.

Detailed Procedures - Mill Well Closures

Prior to any abandonment activities, the protective surface casing, cement pad and guard posts will be removed, if they exist.

The next step of closure will be to clean-out the uncased sections of the wells. For Mill Well 1, this will include removal of an unknown amount of sediment from the well. The cleaning process will be conducted to produce a proper bond between the plugging material and the borehole walls. The borehole will be cleaned by drilling out the hole using air rotary-mist drilling techniques to minimize production of fluids. Foaming agents will only be used if necessary as determined by Geotech and will be biodegradable and nontoxic. All material removed from the wells shall be contained.

Once a well is cleaned, three borehole volumes of ground water will be purged from the wells by the Subcontractor and ground water samples collected by Geotech. Borehole volumes shall be calculated based on water levels which shall be measured at the time of closure by the Subcontractor. Ground-water samples shall be collected by Geotech immediately after the wells have been purged. Records shall be kept on the volume of water purged from each well. Purge water shall be contained separately from sediments removed in the previous step. Results from the ground water samples that are collected may indicate that the water is clean and can be discharged to the ground surface.

The section of the well below the casing shall be plugged before any additional closure activities to prevent contamination of this section from follow-on activities. Plugging will be accomplished by filling the borehole, under pressure, from the bottom up using a tremie pipe or equivalent.

The first step for abandonment of the cased section of the borehole will be to attempt to remove the casing from the borehole using casing jacks. If the casing can be removed, the borehole will be incrementally filled with plugging material from the bottom up as the casing is removed to prevent collapse of the borehole. The borehole will be filled with plugging material to within 12 feet of the ground surface elevation expected after remedial action.

TABLE 1. WELL COMPLETION INFORMATION

	Total Depth[1] (ft)	Measured Depth[2] (ft)	Water Level[2] (ft-bgs)	Casing Depth[3] (ft-bgs)	Approx. Depth to: (ft-bgs) Final Excavation Surface[1]	Dakota Sandstone Formation[1]	Burro Canyon Formation[1]
Mill Well-1	NA	105	97	NA[4]	26	35	125
Mill Well-2	NA	255	106	133	2	25	115
Mill Well-3	NA	239	87	118	2	35	125
Corehole 34A	163	68	dry	NA[5]	22	30	130
Corehole 59	38	38	35	NA[5]	32	-	-
Corehole 36B	143	55	dry	NA[5]	34	50	140
Corehole 63	68	65	26	NA[5]	15	20	-

NOTES:

1 Estimated from borehole logs

2 Measured August 1990, Mill Well-1 is probably filled with over 100 ft. of sediment

3 Measured May 1991

4 Could not get below casing at 98 ft., hole is filled with unknown depth of sediment.

5 Expected to be the total depth of the corehole.

NA = Information is not available.

The casing that is removed will be hauled to a designated location on the top of the East Tailings Area. The casing will be scanned by Geotech to determine if decontamination is required. If the casing must be decontaminated, it will remain on the East Tailings Area for decontamination by Geotech with other debris that is expected to be encountered during future tailings remediation.

If the casing cannot be removed, the casing shall be cut at five-foot intervals using a rotary blade type casing cutter. Using an appropriate pressure (expected to be 250 psi but which will be defined by Geotech) and tremie pipe or equivalent, inject bentonite product into cut sections of casing using packers to progressively isolate 10-foot sections towards the surface to within 12 feet of the ground surface elevation expected after remedial action.

Once the borehole is filled with plugging material, fill the borehole or remaining casing to within 2 feet of the ground surface elevation expected after remedial action with an approved surface plugging material such as a cement-bentonite mixture. If the ground surface elevation expected after remedial action is the same as the existing ground surface, trim the casing two feet below ground surface and nominally backfill with native soil.

After the well has been plugged, drive 5-foot steel fencing posts 2 feet into the ground at the previous location of the casing to mark the location of the abandoned wells. Geotech will survey the location of the posts for future reference.

All abandonment work will be at the direction of Geotech.

Detailed Procedures - Corehole Closures

Closure of the coreholes will proceed in a similar manner, however, collection of ground-water samples from the coreholes is not required. Since the coreholes are cased with PVC, the casing will be drilled out rather than an attempt made to pull it out or cut it at 5-foot intervals and pressure inject plugging material. As with the wells, the uncased section of the corehole will be plugged prior to drilling out the casing.

Special Conditions

Access to the project site is via good all-weather roads. The well and borehole locations should be accessible via truck mounted equipment with the exception of Mill-1. Site preparation will be required at this site to provide a level area for the drilling rig. This may require the placement of fill material to level the site and will be the responsibility of the Subcontractor.

Uncontaminated and contaminated boundaries have been established and routes into each area will be designated during operations. Specific pre-entry requirements are established in Geotech's health and safety plans. Routes into the contaminated areas will require frisking stations and decontamination sites for all equipment and personnel entering and leaving the area. Frisking will be conducted by Geotech.

4.0 SURFACE AND SUBSURFACE CONDITIONS

This project area is the site of an abandoned uranium milling operation. Most mill buildings have been removed, and the mill tailings piles covered with approximately two feet of soil. Much of the surface area is open ground with a few foundations still visible. The open ground is generally seeded to grass or native vegetation.

The generalized stratigraphy encountered during pervious drilling at the site consists of an assemblage of alluvial sands and gravels, as well as mill tailings which overlie bedrock units of the Mancos Shale, Dakota Sandstone, and the Burro Canyon Formation.

These geological descriptions and assumptions are based on the best data presently available to Geotech. However, the actual conditions which may be encountered during the drilling may vary significantly and, therefore, the Subcontractor should not necessarily rely totally on these assumptions.

5.0 DRILLING LOGS AND DOCUMENTATION OF CLOSURE

The Subcontractor shall furnish to Geotech a complete daily (or shift) drilling log detailing all rig functions, footages, bit records and materials used, as well as any other pertinent drilling data. Geotech will furnish the DAILY DRILLING REPORT FORM to be used. The daily drilling report form shall be examined and signed each day or shift by a designated Geotech representative and the Subcontractor field supervisor. The daily drilling report is subject to further audit by the Geotech technical monitor assigned to this project or by the Geotech drilling coordinator. Any errors found on this report by the Subcontractor should be reported to Geotech, Inc. as soon as possible for reconciliation. A sample copy of the Drilling Report Form is attached. This form is a three-part, carbonless form. The original (white) copy of this form must be returned to Geotech with the Subcontractor's invoices(s). The yellow copy will be retained in the field by the Geotech representative and the pink copy may be retained as a rig copy.

The drilling logs, along with other observations recorded Geotech, will be incorporated into a report to be sent to the State of Utah, State Engineer. This report will summarize the procedures used to abandon the wells and coreholes.

6.0 DRILLING FLUIDS AND WASTE DISPOSAL

The drilling operation must be conducted in a manner that minimizes the volume of water and sediment that will be generated during the well abandonment process. Therefore, air rotary-mist drilling procedures will be used. Control of water and sediments generated during closure and purging of the wells is mandatory. All water and sediments that are generated during the activities shall be impounded in pits that must be constructed near the wells and coreholes. Purge water shall be contained separately from water and sediments removed during the borehole closure process. Proposed locations for these pits are shown on the attached drawings of the site. Piping will be required to transport water and sediments from the Mill Well-1 to the proposed pond locations. Piping must be able to be decontaminated after use. The Subcontractor's choice of piping shall be approved by Geotech. The

Subcontractor shall assess the need for piping at other locations.

Dry cuttings will be hauled to a designated location on the East Tailings Area.

The pits for both purge water and sediments will require a volume of approximately 2000 gallons, and must be lined with at a minimum 10-mil plastic sheeting to prevent infiltration of water to the subsurface. The pits must be constructed with appropriate materials and procedures such that they will remain viable through the 1991 summer and fall construction season. The pits that will contain materials from the coreholes will be lined excavations of approximately 1000 gallons. Final disposal of the water and sediments in the pits is the reponsibility of Geotech.

Cost of construction of the pits and material, is a reimbursable cost to the Subcontractor.

The Subcontractor will not be considered as a hazardous-waste generator nor transporter for performing these tasks as long as all of the materials stay on the site.

7.0 HEALTH AND SAFETY

All applicable Federal, State, County and City safety regulations and practices shall be strictly adhered to at all times. These regulations and practices shall include, but are not solely limited to, the wearing of approved safety hats, shoes, glasses and etc. No unauthorized personnel will be allowed on the project area.

The Contractor (Geotech) shall be responsible for operational health and safety coverage during the drilling activities. This may include the issuance of personal protective equipment (PPE) such as coveralls, gloves, and bootcovers for workers. The Contractor shall also be responsible for air quality and borehole emission monitoring. All Subcontractor personnel shall adhere to the Geotech Operational Health and Safety (OH&S) regulations as outlined in Appendix B, "Chem Nuclear Geotech Drilling Health and Safety Plan", Appendix C, "Monticello Remedial Action Project Programmatic Health and Safety Plan, and Appendix D, "Site Specific Health and Safety Plan." The "Statement of Understanding" contained in the back of the Drilling Health and Safety Plan must be signed by all Subcontractor personnel prior to working on this project. In the event of a conflict between the three plans, the plan with the more rigorous requirement for the item in question shall govern.

At the start of every shift, there will be a drilling health and safety meeting. Attendance at this meeting is mandatory for all personnel involved in the drilling operation. Attendance and topics discussed will be documented for each meeting.

The Subcontractor will be required to submit a written Health and Safety plan, stating the Subcontractor's Health and Safety program and implementation plan, as stated on page 1 of Appendix B, "Chem Nuclear Geotech Drilling Health and Safety Plan", before performing any work on this project.

Geotech requires a physician's statement certifying the completion of the medical surveillance which is described in the Monticello Remedial Action Project, Programmatic Health and Safety Plan. The physician's statement shall include the physician's printed name, license number, the state where the license is issued and the physician's signature. In addition, all Subcontractor personnel must be able to wear air purifying canister (full mask-filtered) respirators on demand. This will exclude personnel with beards from working on the project. Also, no smoking, eating or chewing will be allowed except in designated areas.

All Subcontractor personnel who will work on this project will be required to have completed a certified 40-hour OSHA Hazardous Waste/Emergency Response Course, within the last year, covering such topics as respiratory protection, health, safety, and industrial hygiene. If the 40-hour course was taken over one year ago, the individual(s) must have completed an 8-hour certified refresher course within the last year. At least one member of each drill crew, who will be in full time attendance, will have completed an OSHA approved 8-hour SARA Supervisor Course. In addition, at least one member of the drill crew must have completed a certified Red Cross First Aid and CPR training course. **Current documentation of each Subcontractor employee's training shall be presented to and approved by Geotech OH&S prior to commencing any work.**

All Subcontractor personnel (and alternates) who will work on this project will be required to attend a pre-work briefing/orientation prior to any work being performed on this project. This briefing/orientation will be held on-site as soon as the Subcontractor has mobilized his equipment to the plant site.

Geotech requires the use of chemically resistant boots for sites with potential hazardous wastes. Recommended boots are "Bata Polyblend" with cleated sole, steel toe, and steel shank. These boots are constructed using a polyurethane/polyvinyl blend that will provide a greater degree of protection than leather boots with latex bootcovers.

As personnel safety is of the highest priority in performance of the work at this site, U.S. Department of Energy or Chem Nuclear Geotech Inc. personnel will suspend all drilling operations when an unsafe practice or condition is observed. Drilling will not proceed until the unsafe practice or condition is corrected. The Subcontractor shall not be compensated for efforts required to correct any unsafe practice or condition created by his/her actions.

8.0 DECONTAMINATION OF EQUIPMENT

The Subcontractor's equipment shall be thoroughly cleaned and/or washed prior to entering the site and commencing any work on this project. **This initial decontamination shall be at the Subcontractor's own expense and time.** All equipment will be inspected by Geotech personnel before any drilling is performed. Once the drilling has begun, no piece of equipment will be removed from the project site unless it is decontaminated and then inspected by Geotech personnel.

Due to the nature of the subsurface materials, all drillpipe, drillrod, augers, bits, and other downhole tools will likely have some level of contamination after their respective use. Therefore, the Subcontractor shall decontaminate all downhole tool(s) between holes and after completion of the project.

The Subcontractor shall decontaminate downhole tools in the following manner:

a. The contaminated tools shall be cleaned, using a high-pressure steam cleaner, until all visible contamination is removed.

b. All tools will be rinsed with clean potable water.

c. All tools will be air dried.

d. All tools will be inspected by on-site Geotech personnel before being used at another well or corehole or before leaving the site.

All decontamination work shall be performed by the Subcontractor at the stipulated hourly rate and under the direction of Geotech.

An area or areas will be designated for decontamination operations. It will be the Subcontractor's responsibility to erect and maintain a decontamination facility of adequate size and capacity to fully decontaminate the rig(s) and all downhole tools. This facility will be equipped with, but not solely limited to, such items as a self-powered steam cleaner and water supply, washing and drying racks, lined containment ponds, overspray protection, ground covers, segregated clean areas and etc. This facility will be inspected by Geotech personnel or host installation personnel prior to use to insure proper operation of the facility. Cost of this decontamination facility is a reimbursable cost.

9.0 UTILITY LOCATION

The Contractor (Geotech) will attempt to locate all underground utilities prior to commencement of drilling operations at a selected site per the standard procedures described in the Geotech Field Assessments Procedures Manual. These procedures include notification of appropriate utility companies. The Contractor will use standard state-of-the-art equipment and any available utility installation map(s) to determine possible utility locations. However, due to the vast amount of changes and modifications occurring over a period of time, the Contractor does not guarantee all utilities can be accurately located. Should any unknown utility be damaged during the drilling, it will be the Subcontractor's responsibility to repair any such damage to the Contractor's satisfaction. The cost of any utility repair is a reimbursable item to the Subcontractor.

10.0 SUBCONTRACTOR EQUIPMENT

The Subcontractor shall furnish the equipment as specified in the MANDATORY MINIMUM EQUIPMENT LIST contained in this Bid Package or a suitable alternative. Geotech will be the sole authority as to the suitability of any

alternates submitted. The Subcontractor shall assume all liability for loss or damage to his/her equipment during the performance of this project. Geotech will make every reasonable effort to keep the Subcontractor informed of any unusual subsurface conditions or potential hazards as that data becomes available.

11.0 QUALITY ASSURANCE REQUIREMENTS

Subcontractor will be responsible for adhering to the quality control/assurance requirements of the Monticello Remedial Action Program (MRAP) Quality Assurance Project Plan. A copy of this document will be on-site and available for inspection and reference at all times.

The Drilling Subcontractor must be licensed by the State of Utah to drill water wells. In addition, the Subcontractor must comply with all reporting requirements as set forth by the State of Utah. The Subcontractor shall provide to Geotech copies of all reports, logs, and other required documents submitted to the State.

APPENDIX A
CALIPER LOGS

HOLE MILL-1

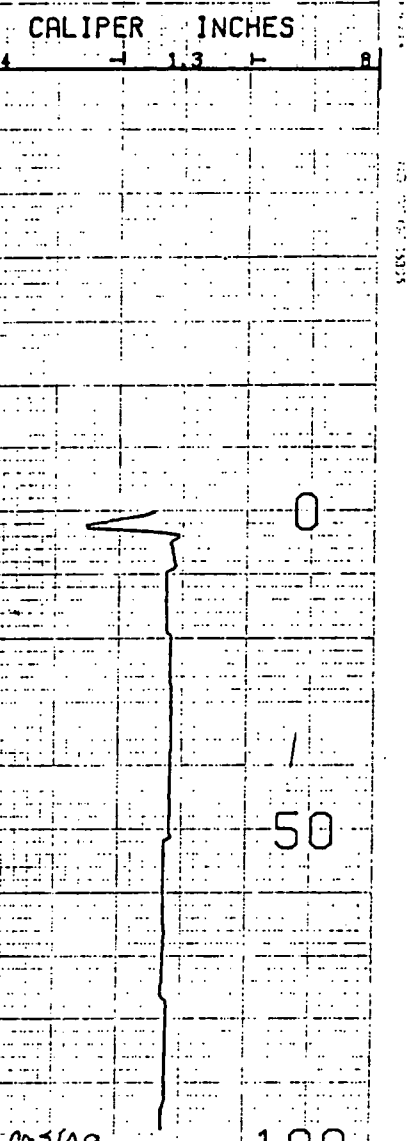
AREA BLM WAREHOUSE

OPER BENHAM

TRUCK 1967

SER # 1

DATE 05-02-91



Could not get below casing.
Well filled with sediment.

HOLE MILL-2

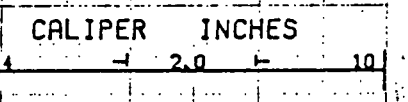
AREA BLM WAREHOUSE

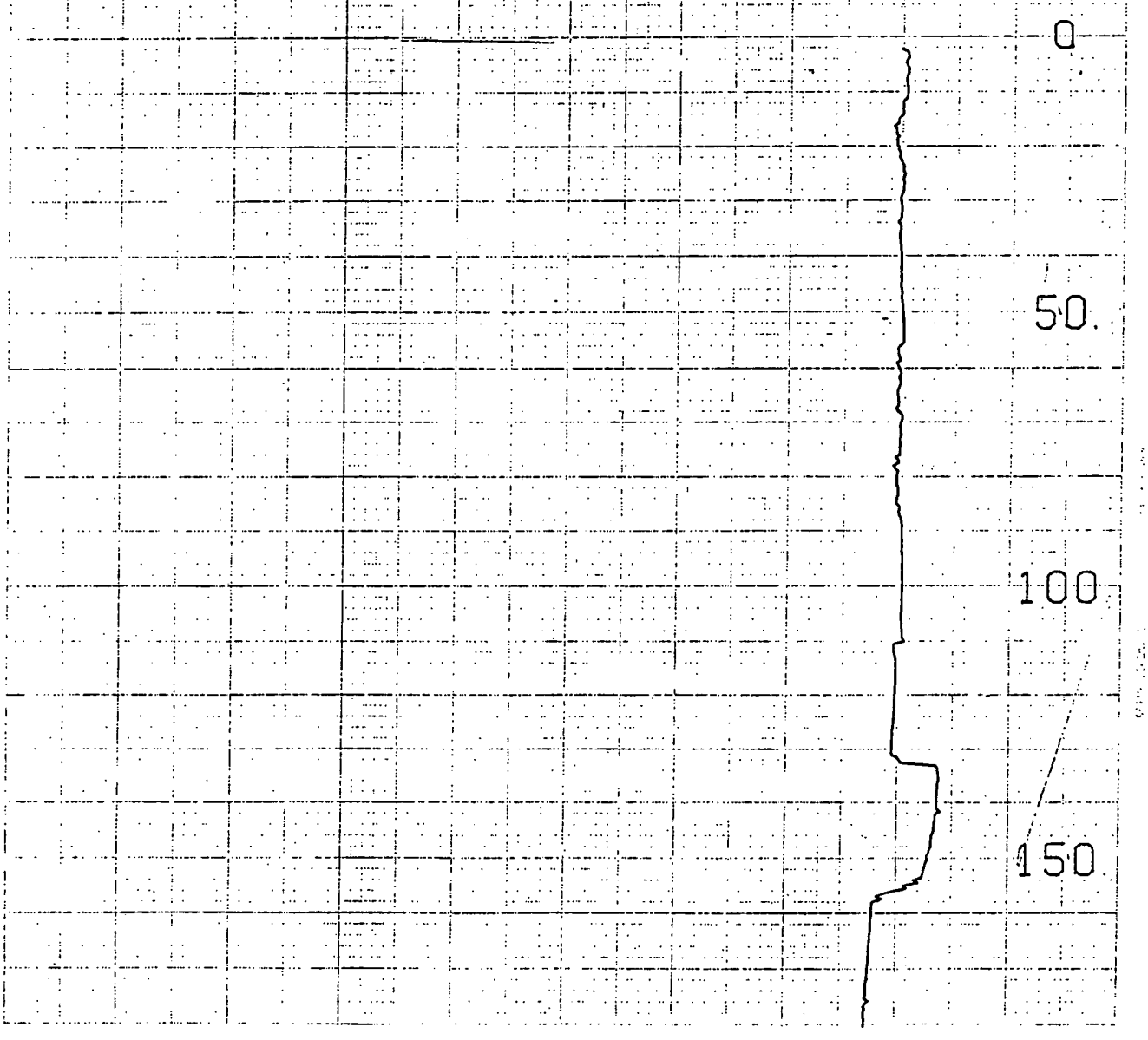
OPER BENHAM

TRUCK 1967

SER # 1

DATE 05-02-91





HOLE MILL-2

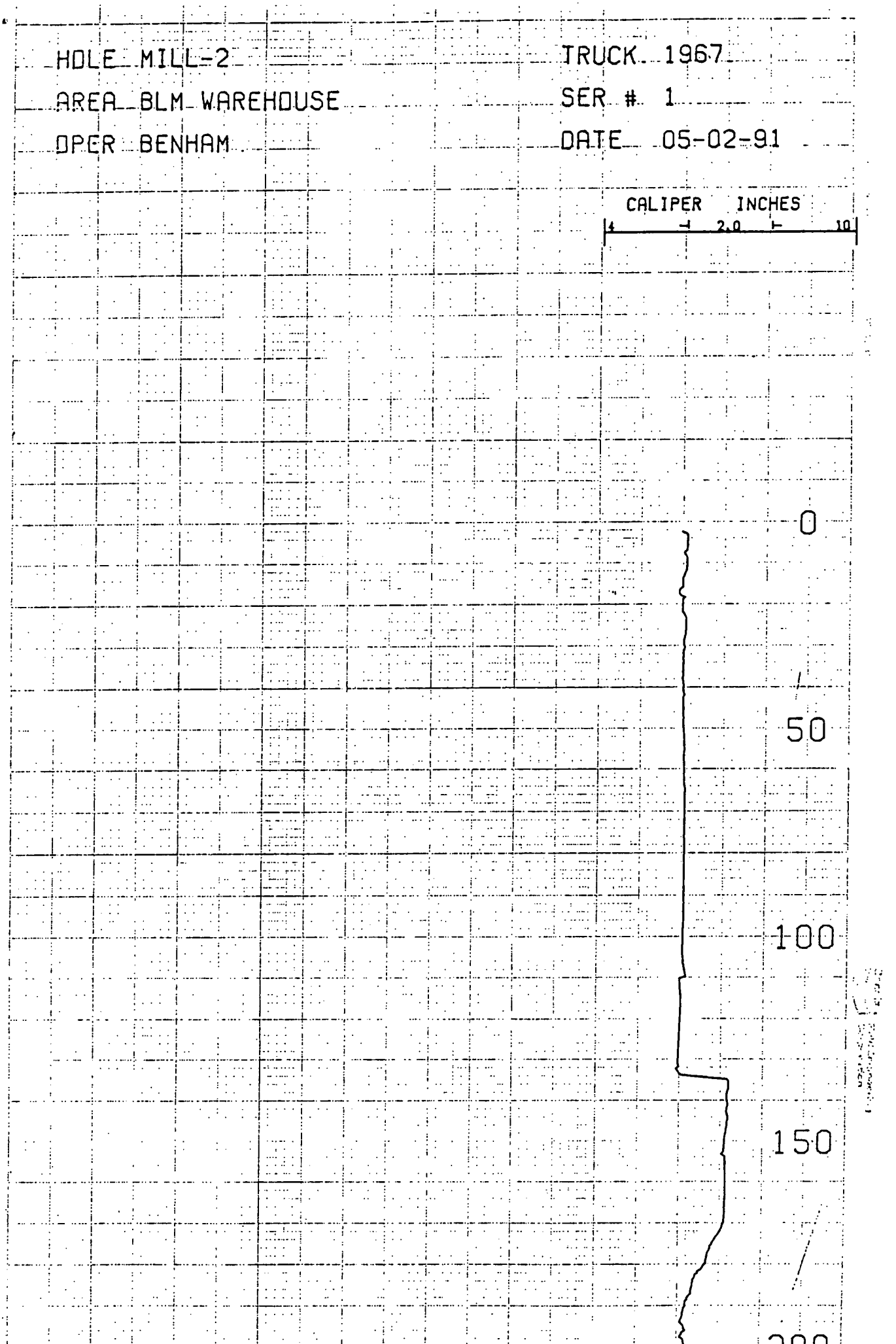
AREA BLM WAREHOUSE

OPER BENHAM

TRUCK 1967

SER # 1

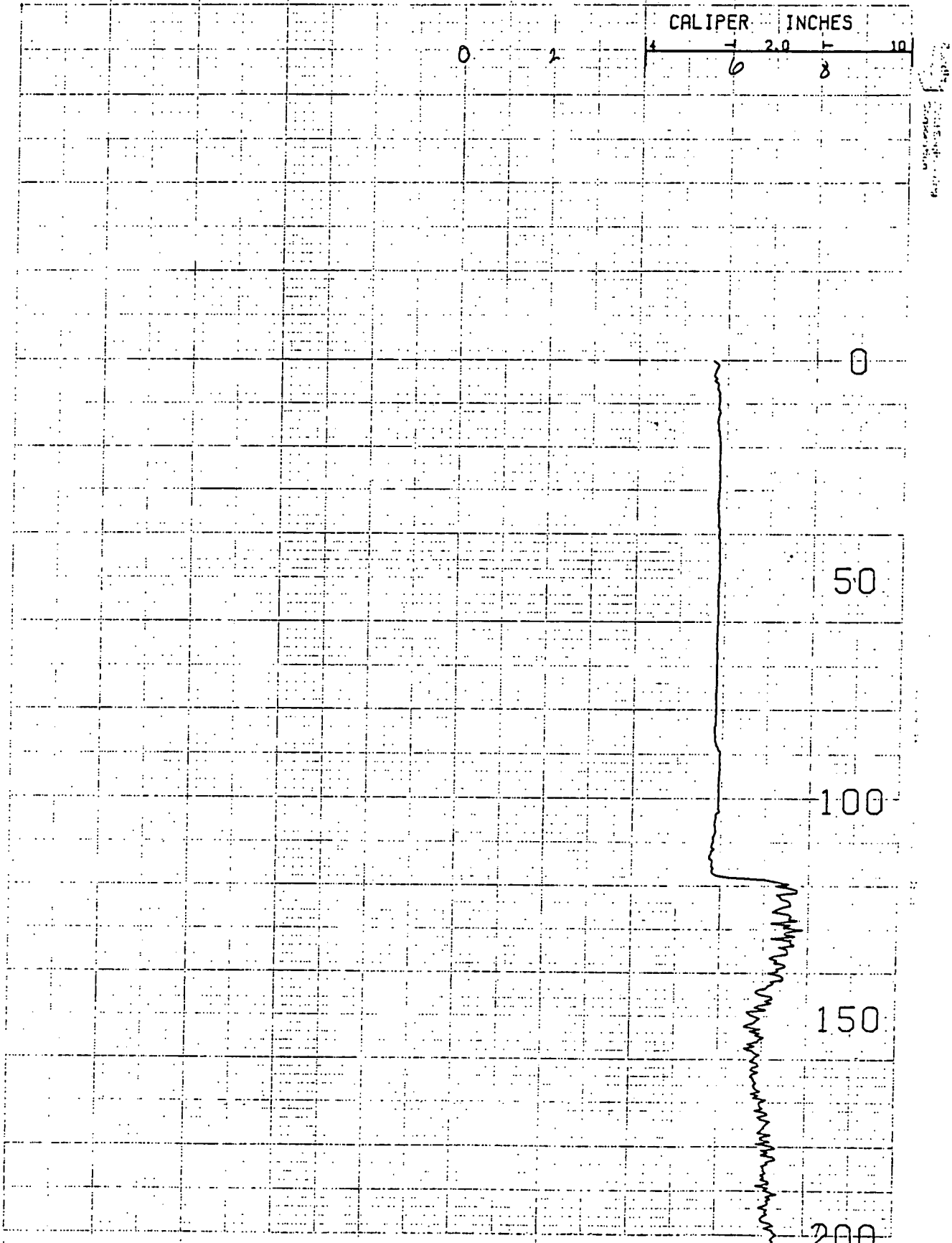
DATE 05-02-91



IDLE MILL-3 TRUCK 1967

AREA BLM WAREHOUSE SER # 1

OPER BENHAM DATE 05-01-91



HOLE MILL-3

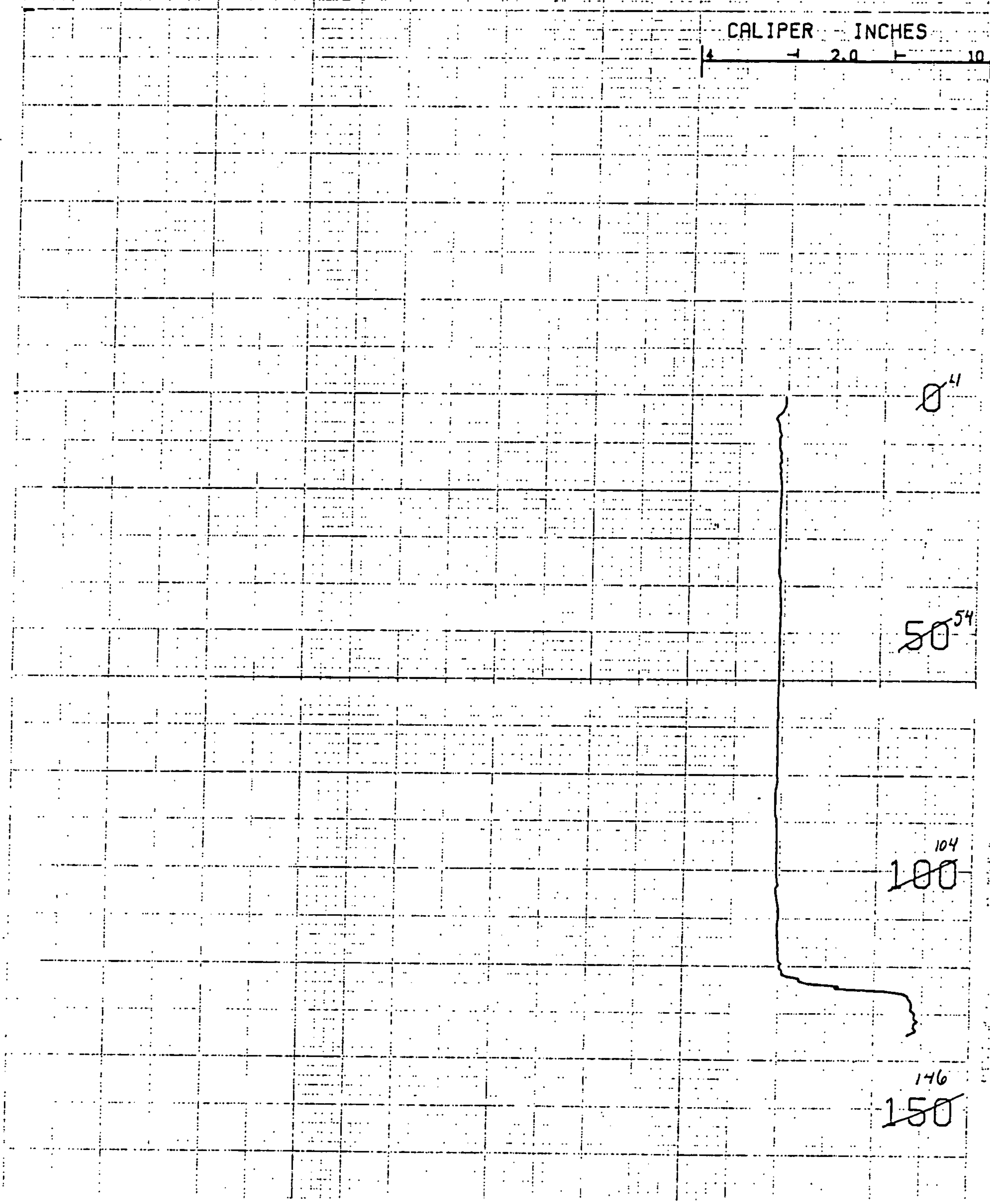
[illegible] GLM WAREHOUSE

[illegible] BENHAM

TRUCK 1967

SER # 1

DATE 05-01-91



APPENDIX B
DRILLING HEALTH AND SAFETY PLAN

January 1991

CHEM-NUCLEAR GEOTECH, INC.
DRILLING HEALTH AND SAFETY PLAN
For Operation of Small Auger, Rotary and Coring Rigs

Introduction

All work under this subcontract shall be conducted in accordance with the established safety regulations of Occupational Safety and Health Administration (OSHA), U. S. Department of Energy (DOE), and other applicable Federal, State, County, and City regulations. The full set of OSHA and DOE Standards are available for inspection and/or questions at the Chem-Nuclear Geotech, Inc. Health, Safety, and Security Section, Grand Junction, Colorado. Compliance inspections will be made by Chem-Nuclear Geotech, Inc. Health, Safety, and Security personnel.

A formal notice of employee rights and obligations is a vital part of this program and must be posted near the job site. The OSHA poster is required to be posted and shall be accessible by all employees.

The safety of all personnel takes priority over all other aspects of the drilling project. All personnel, including Chem-Nuclear Geotech, Inc., Subcontractor and site visitor(s) shall receive daily safety instruction and information regarding potential safety hazards at the site. Such daily training will be documented in the project records. All visitors will be escorted by a Chem-Nuclear Geotech, Inc. representative during their presence at the drilling site(s). **Department of Energy, or Chem-Nuclear Geotech, Inc. personnel will suspend all drilling operations when an unsafe practice or condition is observed. Drilling will not proceed until the unsafe practice or condition is corrected. The Subcontractor shall not be compensated for efforts required to correct any unsafe act or unsafe condition created by his actions.**

The subcontractor is responsible for safe operations of his subcontractors, who are also subject to these rules and regulations. Any injury/illness that occurs as a direct result of work being performed under this subcontract requires an accident report covering the incident. The accident report is to be submitted to Chem-Nuclear Geotech, Inc. Health, Safety, and Security within one working day of the accident.

The subcontractor must have a written and functional safety program to protect site workers, the general public, and the environment. Before work commences, a safety management program and implementation plan which includes, but is not limited to the following, must have been reviewed and approved in writing by Chem-Nuclear Geotech, Inc. Health Safety and Security. The scope of the program will be determined by the size of the project and the hazards of the job. The minimum areas to be covered are as follows:

1. **The Drill Rig Operator:**

   - The drill rig operator should consider the "responsibility" for safety and the "authority" to enforce safety to be a matter for first importance.

- The drill rig operator shall be the leader in using proper personal safety gear and set an example in adhering to the rules and regulations that are set forth for the project.

- The drill rig operator shall enforce the use of proper personal protective safety equipment and take appropriate corrective action when proper personal protective safety equipment is not being used.

- The drill rig operator and crew should understand that proper maintenance of tools and equipment and general "housekeeping" on the drill rig will provide the environment to promote and enforce safety.

- The drill rig operator shall inspect the rig to insure that the required safety devices, e.g. safety engine shut-down switches, are installed and are functional. The drill rig operator shall inspect the rig to insure that applicable safety placards are installed at potential safety hazard locations as recommended by the manufacturer.

- Before drilling is started with a particular drill, it will be assured that the operator has had adequate training and is thoroughly familiar with the drill rig, its controls, its capabilities and operating parameters.

- The drill rig operator will inspect the drill rig at least daily for structural damage, loose bolts and nuts, proper tension in chain drives, loose or missing guards or protective covers, fluid leaks, damaged pressure gauges and pressure relief valves.

- The drill rig operator will check and test all safety devices such as emergency shut-down switches at least daily and preferably at the start of a drilling shift.

- The drill rig operator shall check that all gauges, warning lights and control levers are functioning properly and listen for unusual sounds on each starting of an engine.

- The drill rig operator shall assure that all new drill rig workers are informed of safe operating practices on and around the drill rig. The drill rig operator should assure that each new employee understands the safety requirements and document the new employee's acceptance of the requirements.

- The drill rig operator shall observe the mental, emotional and physical capability of each worker to perform the assigned work in a proper and safe manner.

- The drill rig operator shall assure that there is a fully stocked first-aid kit and OSHA/DOT approved fire extinguisher on the rig.

- The drill rig operator (and as many crew members as possible) shall be well trained and capable of using first-aid kits, fire extinguishers and all other safety devices and equipment.

- The drill rig operator will maintain a list of addresses and telephone numbers of emergency assistance units (ambulance services, police,

hospitals, etc.) and inform other members of the drill crew of the existence, location and proper use of the list.

2. **Individual Protective Equipment**

- o Clothing will be close fitting but comfortable, without loose ends, straps, draw strings or belts or otherwise unfastened parts that might catch on some rotating or moving component of the drill.

- o Assure that personal protective equipment provided meets NIOSH/ANSI specifications.

- o Safety Head Gear. Safety hats (hard hats) will be worn by everyone working or visiting at or near a drill site.

- o Safety Shoes or Boots. Safety shoes or boots should be worn by all drilling personnel and all visitors to the drill site that observe drilling operations within close proximity of the drill rig.

- o Safety Glasses. All drilling personnel and visitors to the drill site are required to wear approved safety glasses or goggles while the drill rig is in operation or other drilling functions are being performed. Presciption glasses shall be an approved safety type or goggles must be used.

- o Gloves. All drilling personnel shall wear gloves for protection against cuts and abrasion which could occur while handling wire rope or cable and from contact with sharp edges and burrs on drill rods and other drilling or sampling tools.

- o Other Protective Equipment. For some drilling operations, the environment or regulations may dictate that other protective equipment be used. Each drill rig worker should wear noise reducing ear protectors when appropriate. When drilling is performed in chemically or radiologically contaminated ground, special protective equipment and clothing may and probably will be required.

3. **Housekeeping On and Around the Drill Rig**

- o Suitable storage locations should be provided for all tools, materials and supplies so that tools, materials and supplies can be conveniently and safely handled without hitting or falling on a member of the drill crew or a visitor.

- o Avoid storing or transporting tools, materials or supplies within or on the mast (derrick) of the drill rig.

- o Pipe, drill rods, casing, augers and similar drilling tools should be orderly stacked and secured on racks or sills to prevent spreading, rolling or sliding.

- o Penetration or other driving hammers should be placed at a safe location on the ground or be secured to prevent movement when not in use.

- Work areas, platforms, walkways, scaffolding and other access ways should be kept free of materials, debris and obstructions and substances such as ice, grease or oil that could cause a surface to become slick or otherwise hazardous.

- Keep all hand controls, control linkages, warning and operation lights and lenses free of excess oil, grease, ice, or other foreign material.

- Do not store gasoline in any portable container other than a nonsparking, red container with a flame arrester in the fill spout and having the work "gasoline" easily visible.

- All gasoline engines, when operated in fire danger areas, will be equipped with exhaust spark arresters.

4. **Maintenance Safety**

- Shut down the drill rig engine to make repairs or adjustments to a drill rig or to lubricate fittings (except repairs or adjustments that can only be made with the engine running). Take precautions to prevent accidental starting of an engine during maintenance by removing or tagging the ignition key or ignition control.

- Always block the wheels or lower the leveling jacks or both and set hand brakes before working under a drill rig.

- When possible and appropriate, release all pressure on the hydraulic systems, the drilling fluid system and the air pressure systems of the drill rig prior to performing maintenance.

- Never weld or cut on or near a fuel tank.

- Do not use gasoline or other volatile or flammable liquids as a cleaning agent on or around a drill rig.

- Replace all caps, filler plugs, protective guards or panels and high pressure hose clamps and chains or cables that have been removed for maintenance before returning the drill rig to service.

- All persons shall remain clear of rotating equipment.

- All pressure hose connections shall be secured with safety chains or clamped to prevent whipping in the event of a break.

- Each crew member shall report promptly any worn, defective, or unsafe items which is observed.

- Pipelines, tanks, and other storage facilities (for fuel, oil, gas, mud, soap, etc.) shall be kept from leaking.

5. **Safe Use of Hand Tools**

- When a tool becomes damaged, either repair it before using it again or remove from service.

- Keep all tools cleaned and stored in an orderly manner when not in use.

- Never use pipe wrenches in place of a rod holding device.

- Replace hook and heel jaws when they become visibly worn.

- When breaking tool joints on the ground or on a drilling platform, position your hands so that your fingers will not be injured between the wrench handle and the ground or the platform, should the wrench slip or the joint suddenly let go.

6. **Clearing the Work Area**

Prior to drilling, adequate site clearing and leveling should be performed to accommodate the drill rig and supplies and provide a safe working area. Drilling should not be commenced when tree limbs, unstable ground or site obstructions cause unsafe tool handling conditions or potential fire hazards.

7. **Start Up**

- All drill rig personnel and visitors should be instructed to "stand clear" of the drill rig immediately prior to and during starting of an engine.

- Make sure all gear boxes are in neutral, all hoist levers are disengaged, all hydraulic levers are in the correct nonactuating positions and the cathead rope is not on the cathead before starting a drill rig engine.

8. **Safety During Drilling Operations**

- Do not drive the drill rig from hole to hole with the mast (derrick) in the raised position.

- Before raising the mast (derrick) look up to check for overhead obstructions.

- Before raising the mast (derrick), all drill rig personnel (with exception of the operator) and visitors should be cleared from the areas immediately to the rear, front and the sides of the mast.

- Before the mast (derrick) of a drill rig is raised and drilling is commenced, the drill rig must be first leveled and stabilized with leveling jacks and/or solid cribbing. The drill rig should be releveled if it settles after initial set up.

- The operator of a drill rig should only operate a drill rig from the position of the controls. The operator shall remain at control station at all times when rig is in operation.

- Throwing or dropping of tools should not be permitted.

- If it is necessary to drill within an enclosed area, make certain that exhaust fumes are conducted out of the area.

- All unattended boreholes must be adequately covered or otherwise protected to prevent drill rig personnel, site visitors or animals from stepping or falling into the hole. All open boreholes should be covered, protected or backfilled adequately and according to local or state regulations on completion of the drilling project.

- When using a ladder on a drill rig, face the ladder and grasp either the side rails or the rungs with both hands while ascending or descending. Do not attempt to use one or both hands to carry a tool while on the ladder.

- When climbing to a derrick platform that is higher than 20 feet (6 m), a safety climbing device shall be used. Anyone working on a derrick board or platform shall wear a safety belt or harness securely fasten by a safety lanyard.

- When working on a derrick platform, do not guide drill rods or pipe into racks or other supports by taking hold of a moving hoist line or a traveling block. Only rack one pipe stand at a time.

- Loose tools and similar items should not be left on the derrick platform or on structural members of the derricks.

- A derrick platform over 4 feet (1.2 m) above ground surface should have toe boards and safety railing that are in good condition.

- Before manually lifting any object, make sure that the load is within your personal lifting capacity.

- Personnel shall not ride the hoisting line, catline, traveling block, the traveling block hook, the elevators, or any equipment suspended therefrom as a means of ascending or descending to or from the derrick.

- Assure that equipment furnished for use on this site is maintained in safe operating condition and operated by qualified operators. Cranes, pressure vessels, and large earth moving equipment shall have valid certificates and logs of inspection and maintenance.

- Assurance that the location of the nearest phone or radio to contact emergency services shall be prominently posted and that emergency preparedness actions are recognized and communicated to personnel.

- Safety meetings shall be held to inform employees and other subcontractors of progress of work, changes, hazards anticipated and inspection deficiencies or good examples of employee protection. A daily toolbox meeting assures that good communications is maintained. A record must be kept of the subject, attendance taken of the meeting, and suggestions made.

- Horseplay, practical jokes, and scuffling are forbidden at all times on and around the drill rig.

9. **Overhead and Buried Utilities**

- Overhead and buried utilities shall be located, noted and emphasized on all boring location plans and boring assignment sheets.

- When overhead electrical power lines exist at or near a drilling site or project, consider all wires to be alive and dangerous.

- Watch for sagging power lines before entering a site. Do not lift power lines to gain entrance. Call the utility and ask them to lift or raise the lines or deenergize (turn off) the power.

- An observor shall be posted at sufficient distance from the rig to adequately monitor for safe clearance during the raising and lowing of the rig mast when operating in the vicinity of overhead powerlines or other overhead obstructions.

- Before raising the drill rig mast (derrick) on a site in the vicinity of power lines, walk completely around the drill rig. Determine what the minimum distance from any point on the drill rig to the nearest power line will be when the mast is raised and/or being raised. Do not raise the mast or operate the drill rig if this distance is less than 20 feet (6 m). Geotech policy for operating boomed or drilling equipment with mast, tower or derrick in proximity of overhead powerlines requires that a minimum clearance of 20 feet, plus the length of the boom or rig mast as measured in the horizontal plane, be maintained from any power line. The Geotech 20-foot minimum clearance requirement can only be reduced to the OSHA requirement with approval of the Geotech technical monitor or designee. Any such approval will be granted only after a thorough inspection, which must determine that no safety hazard will be created or will exist by the application of the OSHA requirement. Any such variance will be fully documented by the grantor. In addition, a GEOTECH SAFE WORK PERMIT must be issued before any work is performed under the variance.

- The mast shall not be raised or lowered during high wind conditions or when visibility is restricted. Hydraulic systems shall be checked prior to lowering the mast.

10. **Safe Use of Electricity**

- All wiring should be installed using high quality connections, fixtures and wire, insulated and protected with consideration of the drilling environment. Makeshift wiring and equipment should not be permitted.

- All lights positioned directly above working areas should be enclosed in cages or similar enclosures to prevent loose or detached lamps or vaportight enclosures from falling on workers.

- Electrical cables should be guarded and located to prevent damage by drilling operations or by the movement of personnel, tools or supplies.

- All plug receptacles should be the three-prong, U-blade, grounded type and have adequate current carrying capacity for the electrical tools that may be used.

- All electric tools should have three-prong, U-blade, ground wire plugs and cords.

- Do not use electrical tools with lock-on devices.

- All electrical welders, generators, control panels and similar devices should be adequately grounded.

- Control panels, fuse boxes, transformers and similar equipment should have a secure, protective enclosure. Only weather-proof boxes and fittings should be used for exterior application.

- Poles used to hold wiring and lights should not be used for any other purpose.

- Power should be turned off before changing fuses or light bulbs.

- Only qualified electricians will work on electrical devices or on electric lines, do not go near them.

- All portable electrical equipment used by personnel should have GFCI protection.

11. **Safe Use of Wire Line Hoists, Wire Rope and Hoisting Hardware**

- All wire ropes and fittings should be visually inspected during use and thoroughly inspected at least once a week for: abrasion, broken wires, wear, reduction in rope diameter, reduction in wire diameter, fatigue, corrosion, damage from heat, improper reeving, jamming, crushing, bird caging, kinking, core protrusion and damage to lifting hardware.

- All manufactured end fittings and connections shall be installed ac cording to the manufacturer's instructions and loaded according to the manufacturer's specifications. This would include cable clamps and thimbles.

- If a ball-bearing type hoisting plug is used to hoist drill rods, the bearings should be inspected and lubricated daily to assure that the hoisting plug rotates freely under load.

- Wire ropes must be properly matched with each sheave. Non-rotating wire rope is suggested for light rig application.

- Minimize shock loading of a wire rope - apply loads smoothly and steadily.

- Avoid sudden loading in cold weather.

- Never use frozen ropes.

- Protect wire rope from sharp corners or edges. Avoid "pile-up" or uneven spooling of wire rope.

- Replace faulty guides and rollers.
- Replace worn sheaves or worn sheave bearings.
- Replace damaged safety latches on safety hooks before using.
- Know the safe working load of the equipment tackle being used. Never exceed this limit.
- Know and do not exceed the rated capacity of hooks, rings, links, swivels, shackles and other lifting aids.
- Do not guide wire rope on hoist drums with your hands.
- Following the installation of new wire rope, first lift a light load to allow the wire rope to adjust.
- Never leave a load suspended in the air when the hoist is unattended.
- Keep your hands away from hoists, wire rope, hoisting hooks, sheaves and pinch points as slack is being taken up and when the load is being hoisted.
- Never hoist the load over the head, body or feet of any personnel.
- Never use a hoist line to "ride" up the mast (derrick) of a drill rig.

12. **Safe Use of Cathead and Rope Hoists**

- Keep the cathead clean and free of rust and oil and/or grease.
- Check the cathead periodically, when the engine is not running, for rope wear grooves.
- Never wrap the rope from the cathead (or any other rope, wire rope or cable on the drill rig) around a hand, wrist, arm, foot, ankle, leg, or any other part of your body.
- Do not use a rope that is any longer than necessary. A rope that is too long can form a ground loop or otherwise become entangled with the operator's legs.
- Do not use more rope wraps than are required to hoist a load and that can be safely released.
- Do not leave a cathead unattended with the rope wrapped on the drum.
- Position all other hoist lines to prevent contact with the operating cathead rope.
- The cathead operator must be able to operate the cathead standing on a level surface with good, firm footing conditions without distraction or disturbance.

13. Safe Use of Augers

The following general procedures should be used when starting a boring with continuous flight or hollow-stem augers:

- Prepare to start an auger boring with the drill rig level, the clutch or hydraulic rotation control disengaged, the transmission in low gear and the engine running at low RPM.

- Apply an adequate amount of down pressure prior to rotation to seat the auger head below the ground surface.

- Look at the auger head while slowly engaging the clutch or rotation control and starting rotation. Stay clear of the auger.

- Slowly rotate the auger and auger head while continuing to apply down pressure. Keep one hand on the clutch or the rotation control at all times until the auger has penetrated about one foot or more below ground surface.

- If the auger head slides out of alignment, disengage the clutch or hydraulic rotation control and repeat the hole starting process.

- An auger guide can facilitate the starting of a straight hole through hard ground or pavement.

- Only use the manufacturer's recommended method of securing the auger to the power coupling. Do not touch the coupling or the auger with your hands, a wrench or any other tools during rotation.

- Whenever possible, use tool hoists to handle auger sections.

- Never place hands or fingers under the bottom of an auger section when hoisting the auger over the top of the auger section in the ground or other hard surfaces such as the drill rig platform.

- Never allow feet to get under the auger section that is being hoisted.

- When rotating augers, stay clear of the rotating auger and other rotating components of the drill rig. Never reach behind or around a rotating auger for any reason whatever. A minimum of 18 inches clearance shall be maintained between personnel, clothing, footwear and other personal protrudences and the rotating augers, kellys, heads, drillrod or other rotating components of the drill rig.

- Use a long-handled shovel to move auger cuttings away from the auger. Never use your hands or feet to move cuttings away from the auger.

- Do not attempt to remove earth from rotating augers. Augers should be cleaned only when the drill rig is in neutral and the augers are stopped from rotating.

- Auger speed shall be that speed necessary for pentration and cuttings removal. High speed auger rotation shall not be used for penetration

or cuttings removal unless approved by the on-site Chem-Nuclear Geotech, Inc. supervisor. In such case, all unnecessary personnel will be removed from the rig operating area.

14. **Safety During Rotary and Core Drilling**

- o Water swivels and hoisting plugs should be lubricated and checked for "frozen" bearings before use.
- o Pressure relief values will be installed and operable on all circulation systems.
- o Drill rod chuck jaws should be checked periodically and replaced when necessary.
- o Drill rods should not be braked during lowering into the hole with drill rod chuck jaws.
- o Drill rods should not be held or lowered into the hole with pipe wrenches.
- o In the event of a plugged bit or other circulation blockage, the high pressure in the piping and hose between the pump and the obstruction should be relieved or bled down before breaking the first tool joint.
- o When drill rods are hoisted from the hole, they should be cleaned for safe handling with a rubber or other suitable rod wiper. Do not use hands to clean drilling fluids from drill rods.
- o If work must progress over a portable drilling guide (mud) pit, do not attempt to stand on narrow sides or cross members. The mud pit should be equipped with rough surfaced, fitted cover panels of adequate strength to hold drill rig personnel.
- o Drill rods should not be lifted and leaned unsecured against the mast. Either provide some method of securing the upper ends of the drill rod sections for safe vertical storage or lay the rods down.

15. **Off-Road Movement**

- o Before moving a drill rig, first walk the route of travel, inspecting for depressions, stumps, gulleys, ruts and similar obstacles.
- o Always check the brakes of a drill rig carrier before traveling, particularly on rough, uneven or hilly ground.
- o Check the complete drive train of a carrier at least weekly for loose or damaged bolts, nuts, studs, shafts and mountings.
- o Use caution when traveling side-hill, Conservatively evaluate side-hill capability of drill rigs, because the arbitrary addition of drilling tools may raise the center of mass. When possible, travel directly uphill or downhill. Increase tire pressures before traveling in hilly terrain (do not exceed rated tire pressure).

16. **Hazardous Materials and Waste**

- The subcontractor shall assure material safety data sheets (MSDS) are provided for all hazardous materials and personnel are trained in accordance with 29 CFR 1910.1200.

- Chemicals, corrosives, etc. shall be properly labeled, placarded and stored.

17. **Subcontractor Statement of Understanding**

The Subcontractor and each Subcontractor employee working on this project is required to read and fully understand the provisions of this Plan. The Subcontractor and each Subcontractor employee working on this project shall sign the attached STATEMENT OF UNDERSTANDING before commencing any work on this project.

CN GEOTECH DRILLING SAFETY AND HEALTH PLAN

STATEMENT OF UNDERSTANDING

I, the undersigned, am an employee of the Subcontractor, doing business as, _____, have received and have read the Chem-Nuclear Geotech, Inc. Drilling Health and Safety Plan. Further, I understand all provisions of the Plan.

	Name (please print)	Signature	Date	Position
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APPENDIX C
MONTICELLO REMEDIAL ACTION PROJECT
PROGRAMMATIC HEALTH AND SAFETY PLAN

APPENDIX D
SITE SPECIFIC HEALTH AND SAFETY PLAN FOR THE 1991 MILLSITE CHARACTERIZATION OF THE MILLSITE AREA